

EUKROHNIA CALLIOPS, A NEW SPECIES OF
CHAETOGNATHA FROM THE NORTHERN GULF OF
MEXICO WITH NOTES ON RELATED SPECIES

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Abstract.—*Eukrohnia calliops*, a new species of Chaetognatha, was discovered in deep-water plankton collections made at four stations in the northern Gulf of Mexico in August 1987, and in February 1988. The new species appears to occur in bottom water over the upper continental slope at depths between 200 and 700 m. Its large pigmented eyes easily distinguish it from other *Eukrohnia* species occurring in the Gulf of Mexico. It differs from the closely related *E. kitoui* Kuroda, 1981, a species from Japanese waters, chiefly by the size and shape of the eyes. Thirteen specimens of *E. calliops* are studied and compared with specimens of *E. kitoui*, *E. proboscidea*, and *E. fowleri*, all of which possess pigmented eyes. The first record of *E. proboscidea* in the Gulf of Mexico is documented and affinities within the proposed "proboscidea group" are discussed. Distribution records of four species of *Eukrohnia* reported from the Gulf of Mexico prior to this study are presented with a key separating the six species now known.

Members of the chaetognath genus *Eukrohnia* typically inhabit deep-water plankton communities throughout the world (Alvariño 1965, 1969 for zoogeography). Of the nine currently described species of *Eukrohnia* (Casanova 1986), only three are known to possess pigmented eyes: *E. fowleri* Ritter-Zahony, 1909, *E. proboscidea* Furnestin & Ducret, 1965, and *E. kitoui* Kuroda, 1981. *Eukrohnia fowleri* has a well known cosmopolitan distribution, while the latter two species appear restricted to deep coastal waters of the Atlantic Ocean and the Pacific coast of Japan, respectively.

One hundred and eighty three specimens of an undescribed species of *Eukrohnia* with large pigmented eyes were discovered in plankton samples collected at four study areas in the northern Gulf of Mexico in August 1987 and February 1988 by personnel of the Gulf Coast Research Laboratory aboard the R/V *Tommy Munro* (Fig. 1, Table 1). Quantitative samples were obtained by towing horizontally at depths of 200-500

meters using a Niskin double-trip system with 1 m diameter, 333 μm mesh nets. Qualitative samples were obtained near the bottom with 0.3 m diameter, 183 μm mesh nets attached to crab traps and allowed to passively filter the bottom current. Only material from the February 1988 cruise was used in this work because specimens in the August 1987 samples were in poor condition.

Class Sagittoidea Claus and Grobben, 1905
Order Phragmophora Tokioka, 1965
Family Eukrohniidae Tokioka, 1965
Genus *Eukrohnia* Ritter-Zahony, 1909

Diagnosis.—One pair of lateral fins emerging at or near ventral ganglion; one pair of tooth rows; apical gland cell complex, or papillae tuft, at anteroventral point of head; ventral transverse musculature in trunk segment extending from neck to at least posterior edge of ventral ganglion.

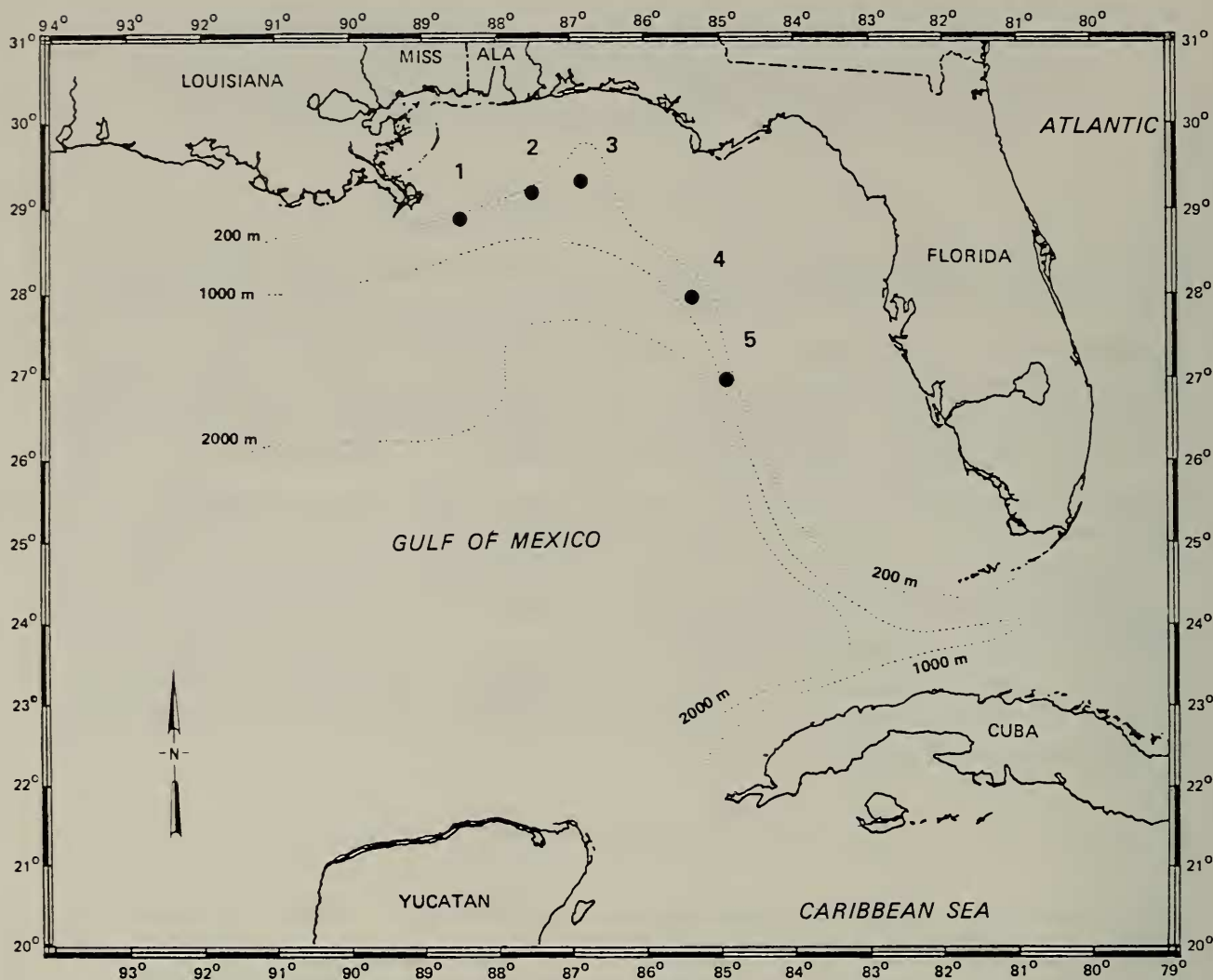


Fig. 1. Map showing locations of five study areas along the continental slope in the northern Gulf of Mexico from which deep-water plankton collections were made in August 1987, and February 1988.

Eukrohnia calliops, new species
Figs. 2, 3, Tables 1-4

Material.—Holotype, 21.5 mm (USNM 119293), R/V *Tommy Munro*, Area 3, (29°21'N, 86°57'W) northern Gulf of Mexico, 200–500 m, 16 Feb 1988, 1910 CDT, 11 paratypes as follows: 1 specimen, 18.2 mm (USNM 119296), from type locality; 2 specimens 18.4, 15.0 mm (USNM 119294), from Area 1 (29°00'N, 88°26'W), 677 m, 28 Feb 1988, 1930 CDT; 5 specimens, 14.4, 12.6, 11.7, 10.4, 8.4 mm (USNM 119295), from Area 2 (29°18'N, 87°32'W), 200–500 m, 13 Feb 1988, 1035 CDT; 1 specimen, 16.6 mm (GCRL 1131), from Area 4 (27°50'N, 85°24'W), 400–485 m, 25 Feb

1988, 2345 CDT; 3 specimens, 16.2, 13.0, 11.3 mm (GCRL 1132), from Area 4 (27°50'N, 85°24'W), 677 m, 26 Feb 1988, 1910 CDT.

Description.—Based on type material with five stages of sexual maturity described in Table 2. Body firm, translucent, with well-developed dorsal and ventral longitudinal muscle bands; widest at trunk-caudal septum, tapering slightly toward the head; maximum length recorded 21.5 mm. Tail length 21.7–29.3% of total body length. Head wider than long with distinct constriction at neck. Corona ciliata not observed. Collar (alveolar tissue) absent.

Eyes large, bulbous, sub-oval to tear-drop shaped (Figs. 3C, 5B); widely separated on

Table 1.—Station and hydrographic data for *Eukrohnia* species in the northern Gulf of Mexico.

| Station | Position | Date | Time | Bottom depth (m) | Sampling depth (m) | Length of tow (min) | Bottom salinity (ppt) | Bottom temp. (°C) | Number of specimens | | |
|---------|-------------------|----------|------|------------------|--------------------|---------------------|-----------------------|-------------------|---------------------|-----|-----|
| | | | | | | | | | Ec. | Ef. | Ep. |
| Area 1 | 29°02'N, 088°27'W | 08/02/87 | 2007 | 494 | 200–400* | 33 | 36.0 | 8.4 | 3 | 0 | 0 |
| | 29°00'N, 088°26'W | 02/28/88 | 1930 | 677 | 677** | 25 hr | 36.0 | 6.5 | 2 | 0 | 0 |
| Area 2 | 29°18'N, 087°34'W | 08/04/87 | 1910 | 494 | 200–400* | 44 | 38.0 | 8.6 | 131 | 0 | 0 |
| | 29°18'N, 087°32'W | 02/13/88 | 1035 | 677 | 200–500 | 30 | 34.0 | 6.3 | 5 | 0 | 0 |
| | 29°18'N, 087°32'W | 02/14/88 | 0730 | 677 | 677** | 23 hr | 34.0 | 6.3 | 5 | 0 | 0 |
| Area 3 | 29°21'N, 086°57'W | 08/06/87 | 0838 | 677 | 200–500 | 54 | 39.0 | 6.4 | 13 | 0 | 0 |
| | 29°21'N, 086°57'W | 02/16/88 | 1910 | 677 | 200–500 | 94 | 36.0 | 6.7 | 2 | 3 | 0 |
| | 29°21'N, 086°57'W | 02/17/88 | 1840 | 677 | 677** | 25 hr | 36.0 | 6.7 | 7 | 0 | 0 |
| Area 4 | 27°54'N, 085°16'W | 08/08/87 | 1150 | 494 | 200–400 | 31 | 38.0 | 7.7 | 1 | 0 | 0 |
| | 27°50'N, 085°24'W | 02/25/88 | 2345 | 494 | 400–485 | 27 | 38.0 | 8.4 | 1 | 0 | 0 |
| | 27°50'N, 085°24'W | 02/26/88 | 1910 | 677 | 677** | 24 hr | 38.0 | 6.5 | 3 | 0 | 0 |
| Area 5 | 27°00'N, 084°57'W | 02/24/88 | 0720 | 677 | 677** | 24 hr | 38.0 | 6.6 | 0 | 4 | 1 |

* Net accidentally dragged bottom.

** Passive sampling by 0.3 m diameter nets attached to crab traps.

Ec. = *E. calliops*, Ef. = *E. fowleri*, Ep. = *E. proboscidea*.

dorsal surface of the head. Pigment cups lunate to hemispherical, dark-brown to black in color; oriented parallel to longitudinal body axis with apex of cup on inner median edge of eyes.

Apical gland cell complex bilobate, protruding anteriorly. Two less conspicuous gland cell complexes, a smaller anterior one and a larger posterior one, both with small, densely packed papillae, situated anterior to mouth between vestibular ridges (Fig. 3A).

Hooks 12–13 on each side of head; long, slender, and somewhat straight, with sharply bent tips (Fig. 3D, E); no denticulate hooks observed. Anterior teeth absent. Posterior teeth 9–21 (17–21 in stage III and IV individuals); thin, pointed, set close together (Fig. 3B); located midway between hooks and apical gland cell complex. Up to 20 vestibular palps in one or two rows on vestibular ridge, beginning ahead of and running parallel to entire length of tooth row; those adjacent to teeth elongate, highly transparent with cup-like terminal ends (Fig. 3B).

Gut extending from mouth to anus, flattened laterally into thin ribbon, appears im-

pregnated with fine darkened granular material; usually with distinctly thickened area directly beneath ventral ganglion (Fig. 2B). Intestinal diverticulae absent.

Ventral ganglion located at anterior fourth of body on ventral surface of trunk; small, rectangular to oval in shape, with fine nerve fibers emerging at corners. Ventral transverse musculature extending from neck region past posterior edge of ventral ganglion by a distance of up to one-fourth the length of ganglion (Fig. 2B).

Lateral fins extending along body from posterior third of tail segment to about anterior third of ventral ganglion; broadly rounded at posterior end and tapering anteriorly to delicate ridge; posterior portions entirely rayed to about level of trunk-caudal septum, rays continuing anteriorly along distal edge for about half fin length; inner and anterior portions containing laminar material and fine fibrils. Tail fin distinctively large, broadly triangular, completely rayed.

Ovaries short, club shaped, 10–17 ova per ovary; ova arranged in two rows when viewed laterally (Fig. 2C). Seminal vesicles

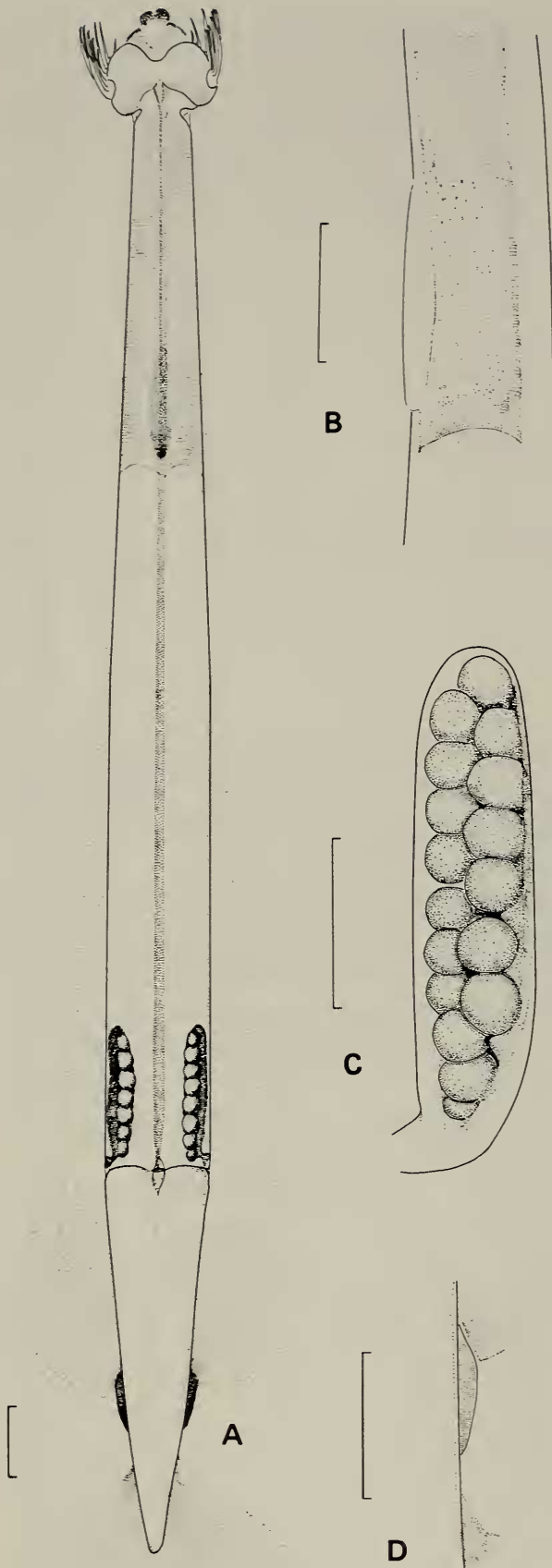


Fig. 2. *Eukrohnia calliops* from the northern Gulf of Mexico. A, ventral view of a mature specimen; B, lateral view of ventral ganglion area with cut-away showing thickened area of gut tube underlying transverse musculature; C, lateral view of ovary at maturity stage III; D, detail of mature seminal vesicle.

oval to elongate, about a third their length overlapped by posterior edges of lateral fins; separated from tail fin by about a fourth their length (Fig. 2D).

Etymology.—The specific name is derived from the Greek words “kallos” (beauty) and “ops” (pertaining to the eyes), and is a noun in apposition.

Comparative material examined (Table 3).—

Eukrohnia kitoui, 10 specimens, 4.7–25.4 mm; Tokyo Bay, Japan (35°08'N, 139°46'E), 13 Feb 1981, 0–240 m; from Kazunori Kuroda, Tokai Regional Fisheries Research Laboratory, Tokyo, Japan.

Eukrohnia proboscidea, 2 specimens, one 18.0 mm; origin unknown; from Jean-Paul Casanova, Laboratoire de Biologie animal (Plancton), Marseille, France.

Eukrohnia proboscidea, 1 specimen, 10.6 mm; Gulf of Mexico (27°00'N, 84°57'W), 14 Feb 1988, 677 m; from Area 5, R/V *Tommy Munro* (Table 1).

Eukrohnia fowleri, 7 specimens co-occurring with *E. calliops* and *E. proboscidea* in the northern Gulf of Mexico (Table 1).

Results and Discussion

Affinities.—Morphological characteristics of the four species of *Eukrohnia* possessing eye pigmentation are compared in Table 4 which combines personal observations with published data.

Eukrohnia calliops is most closely related to *E. kitoui* (Figs. 4B; 5C, D). The two species are very similar in all respects including eye pigment configuration. In fact, they were at first considered synonymous until a detailed comparison was made between non-contracted *E. calliops* specimens collected in February 1988 and material of similar condition from Tokyo Bay, Japan. Results of this comparison appear in Table 3 and Fig. 6. *Eukrohnia calliops* has greater numbers of posterior teeth and higher tail segment percentages in specimens of comparable size. Obvious differences between the two species are eye size and the appearance of the pig-

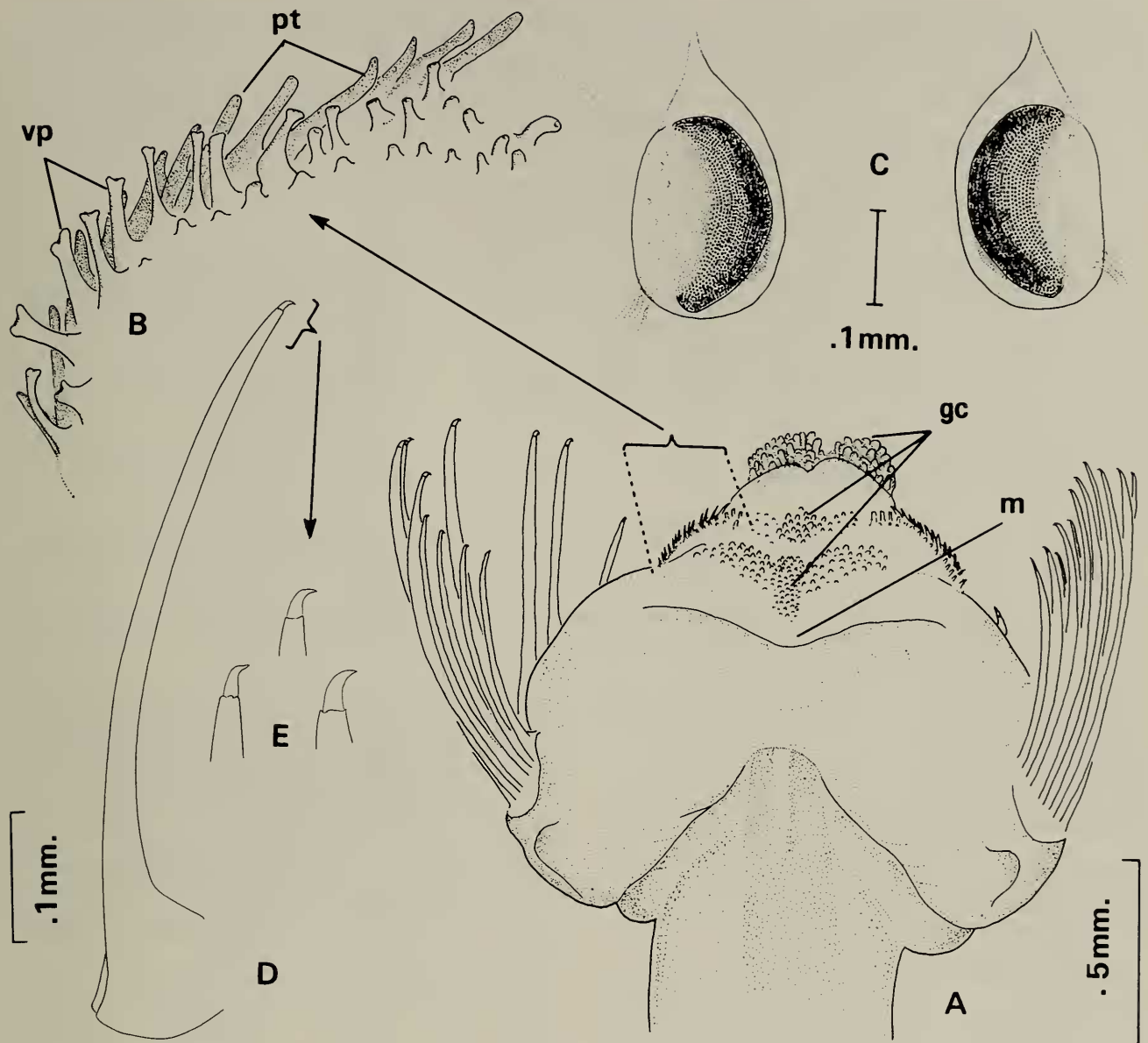


Fig. 3. Head details of *Eukrohnia calliops*, holotype: A, ventral view of head; B, vestibular ridge showing rows of palps and teeth; C, dorsal view of eyes; D, mature hook; E, hook tip variations. (Abbreviations for Fig. 3A, B: gc = gland cell complex, m = mouth, pt = posterior teeth, vp = vestibular palps.)

ment cup within the eye. The pigment cups of *E. calliops* are darker in color, larger in relation to the total area of the eye, and have a greater three-dimensional aspect causing them to “bulge” from the surface of the head. The larger eye size of *E. calliops* is demonstrated in Fig. 6 which compares ratios of eye length to total body length (EL/TL \times 100) between the two species. *Eukrohnia calliops* was found to differ from *E. kitoui* at the 95% level of significance using a t-test on the mean ratios with variances pooled.

Eukrohnia proboscidea (Figs. 4C; 5E, F), originally described from tropical African

waters by Furnestin & Ducret (1965), is apparently a close relative of *E. calliops* and *E. kitoui* as demonstrated by their morphological similarities (Table 4) and similar habitats. As such, the three might be loosely separated from the rest of the genus to form the “proboscidea group.” This grouping would further subdivide the “fowleri group” proposed by Casanova (1986:827), an artificial arrangement of five species of *Eukrohnia* based on the presence of similar light sensitive cells in the eyes, pigmentation in the digestive tube, and numbers and coloration of hooks.

Table 2.—Maturity stages for *Eukrohnia calliops* in February 1988 collections from the Gulf of Mexico.

| Stage | TL (mm) | Male gonads | Female gonads |
|-------|-----------|--|--|
| I | 8.4–12.6 | Testes are small rods originating in anterior-lateral corners of tail segment and not extending over half the length of the segment; spermatids not enlarged; seminal vesicles not formed. | Ovaries short, club-shaped; no ova formed but oocyte clusters present. |
| II | 11.7–14.4 | Testes elongated to full length of caudal segment; spermatids enlarging; seminal vesicles emerging but not enlarged. | Ovaries longer (4% TL); ova small, uniform in size, arranged in 2 rows or clustered. |
| III | > 15.0 | Testes completely fill tail segment; sperm cells enlarged; seminal vesicles enlarged, fully formed. | Ovaries longer and thicker (5–7% TL); some ova enlarged (3–5 per ovary), arranged in 2 rows. |
| IV | > 15.0 | Tail segment partially empty; seminal vesicles ruptured. | Ovaries at maximum length (10–11% TL); all ova enlarged (10–14 per ovary), arranged in 2 rows. |
| V | > 18.0 | Tail segment empty (spent). | Ovaries contracted, empty (spent) or with 1 or 2 large ova; oviducts swollen. |

The pigment of *E. proboscidea*, which is situated in the posterior portion of the eye, differs considerably from that of *E. calliops* and *E. kitoui*. It is light-brown in color with a distinct black edge along the inner border which lends a “U”-shaped appearance when viewed dorsally.

An interesting affinity within the “proboscidea group” is the posterior extent from the neck of the ventral transverse musculature. Casanova (1986:831) found that for *E. proboscidea* the musculature exceeded the position of the ventral ganglion by half the length of the ganglion. He considered this to be a unique feature of that species and stated that in all other members of the genus *Eukrohnia*, the musculature extends only to the edge of the ganglion. The overreaching of the musculature by a fourth the length of the ganglion in *E. calliops*, while not as great an extent as that of *E. proboscidea*, does demonstrate a similarity. In the largest specimen of the *E. kitoui* material (25.4 mm), the extent of transverse musculature was similar to that of *E. calliops*; however, this characteristic was reported by Kuroda (1981:181) as “extending from the neck to the posterior edge of the ventral ganglion.”

The hooks of the “proboscidea group” species are nearly identical. The hook tips (Fig. 3E), abruptly deflected inward at 45–90°, are similar to those of *E. hamata* and *E. bathypelagica*. Denticulate hooks, a common characteristic in juveniles of *Eukrohnia* and *Heterokrohnia* (Kapp & Hagen 1985:58), were not found on small specimens of the “proboscidea group” in this study nor were any reported by Kuroda (1981) for *E. kitoui* or by Furnestin (1965) for *E. proboscidea*. Owre (1973:957), however, reported that the ventral-most hooks on 13.0 and 16.5 mm specimens of *E. proboscidea* from the Caribbean Sea were “serrated with 10–18 small hooks.”

The single specimen of *E. proboscidea* obtained from the bottom sample at Area 5 represents a new record for the Gulf of Mexico. At 10.6 mm, it is the smallest specimen yet recorded for the species. Meristic counts were similar to those reported by Owre (1973) for a 13.0 mm specimen from the Caribbean Sea but the Gulf specimen had fewer number of hooks and teeth than the smallest specimen (13.3 mm) of the type material from tropical African waters (Ducrot 1965). The Gulf of Mexico specimen

Table 3.—Meristic values of *Eukrohnia* comparison material.

| TL mm | % Tail | Hooks | Teeth | Eye L mm | Mat. St. | Source |
|--|--------|---------|-------|----------|----------|------------------|
| <i>Eukrohnia calliops</i> , n. sp. from the Gulf of Mexico | | | | | | |
| 21.5 | 24.9 | 12 | 21 | 0.26 | IV–V | A3, 200–500 m |
| 18.4 | 27.0 | 12 | 17 | 0.28 | III | A1, bottom |
| 18.2 | 25.6 | 12 | 15–17 | 0.24 | V | A3, 200–500 m |
| 16.6 | 26.6 | 12 | 17–19 | 0.22 | III | A4, 400–440 m |
| 16.2 | 24.8 | 12–13 | 16 | 0.24 | IV | A4, bottom |
| 15.0 | 29.3 | NA | NA | 0.27 | IV | A1, bottom |
| 14.4 | 23.3 | 13 | 12 | 0.24 | II | A2, 200–500 m |
| 13.0 | 26.4 | 12 | 13 | 0.20 | II | A4, bottom |
| 12.6 | 21.7 | 12 | 12–13 | 0.20 | I | A2, 200–500 m |
| 11.7 | 25.3 | 12 | 7–11 | 0.19 | II | A2, 200–500 m |
| 11.3 | 31.0 | 13 | 15 | NA | II | A4, bottom |
| 10.4 | 22.3 | 11–12 | 10 | 0.18 | I | A2, 200–500 m |
| 8.4 | 26.7 | 11 | 9–10 | 0.14 | I | A2, 200–500 m |
| <i>Eukrohnia kitoui</i> from Tokyo Bay, Japan (35°08'N, 139°46'E), 0–240 m | | | | | | |
| 25.4 | 24.6 | 13 | 16–17 | 0.20 | IV | Kazunori Kuroda |
| 18.4 | 22.2 | 12 | 14 | 0.17 | III | Kazunori Kuroda |
| 16.6 | 23.6 | 10–11 | 14 | 0.14 | III | Kazunori Kuroda |
| 15.0 | 22.5 | 11 | 13 | 0.14 | II | Kazunori Kuroda |
| 13.4 | 22.8 | 11 | 9–10 | 0.12 | II | Kazunori Kuroda |
| 10.4 | 25.4 | 10 | 7 | 0.10 | II | Kazunori Kuroda |
| 7.9 | 23.2 | 10 | 5 | 0.08 | I | Kazunori Kuroda |
| 7.0 | 25.3 | 9 | 4 | 0.07 | I | Kazunori Kuroda |
| 5.0 | 26.2 | 8 | 3 | 0.06 | I | Kazunori Kuroda |
| 4.7 | 27.4 | 7 | 1 | 0.07 | I | Kazunori Kuroda |
| <i>Eukrohnia proboscidea</i> | | | | | | |
| 18.0 | 23.0 | 12 | 13 | | II | J. P. Casanova |
| NA | NA | 12 | 15 | | II | J. P. Casanova |
| 10.6 | 24.2 | 10 | 8 | | I | A5, Gulf of Mex. |
| <i>Eukrohnia fowleri</i> from the Gulf of Mexico | | | | | | |
| 28.5 | 23.0 | 13 | 27 | | II | A5, bottom |
| 28.5 | 21.3 | 11–13 | 27 | | II | A5, bottom |
| 26.6 | 22.0 | 11 | 20 | | II | A3, 200–500 m |
| 14.4 | 23.3 | 11 | 12 | | I | A3, 200–500 m |
| 14.0 | 24.0 | 11 (2)* | 12 | | I | A3, 200–500 m |
| 11.8 | 20.0 | 12 (4)* | 10 | | I | A5, bottom |
| 10.7 | 20.9 | 12 (4)* | 12 | | I | A5, bottom |

* Denticulate hooks (number).

lacked denticulations on the ventral-most hooks.

Eukrohnia fowleri (Figs. 4D; 5G, H), a cosmopolitan, mesoplanktonic species, differs from the “proboscidea” group in nearly all morphological features and armature meristics. The eye pigment is a dark, variably shaped fleck in the center of the eye. The hooks are robust, red in color, and have

straight tips. The ventral-most three or four hooks of small specimens are strongly denticulate (Table 3).

Ecology and distribution.—Based on available data, the three species of the “proboscidea group” appear to occupy similar habitats in deep-water areas adjacent to coastal regions, although *E. proboscidea* has so far been found at greater depths, with occur-

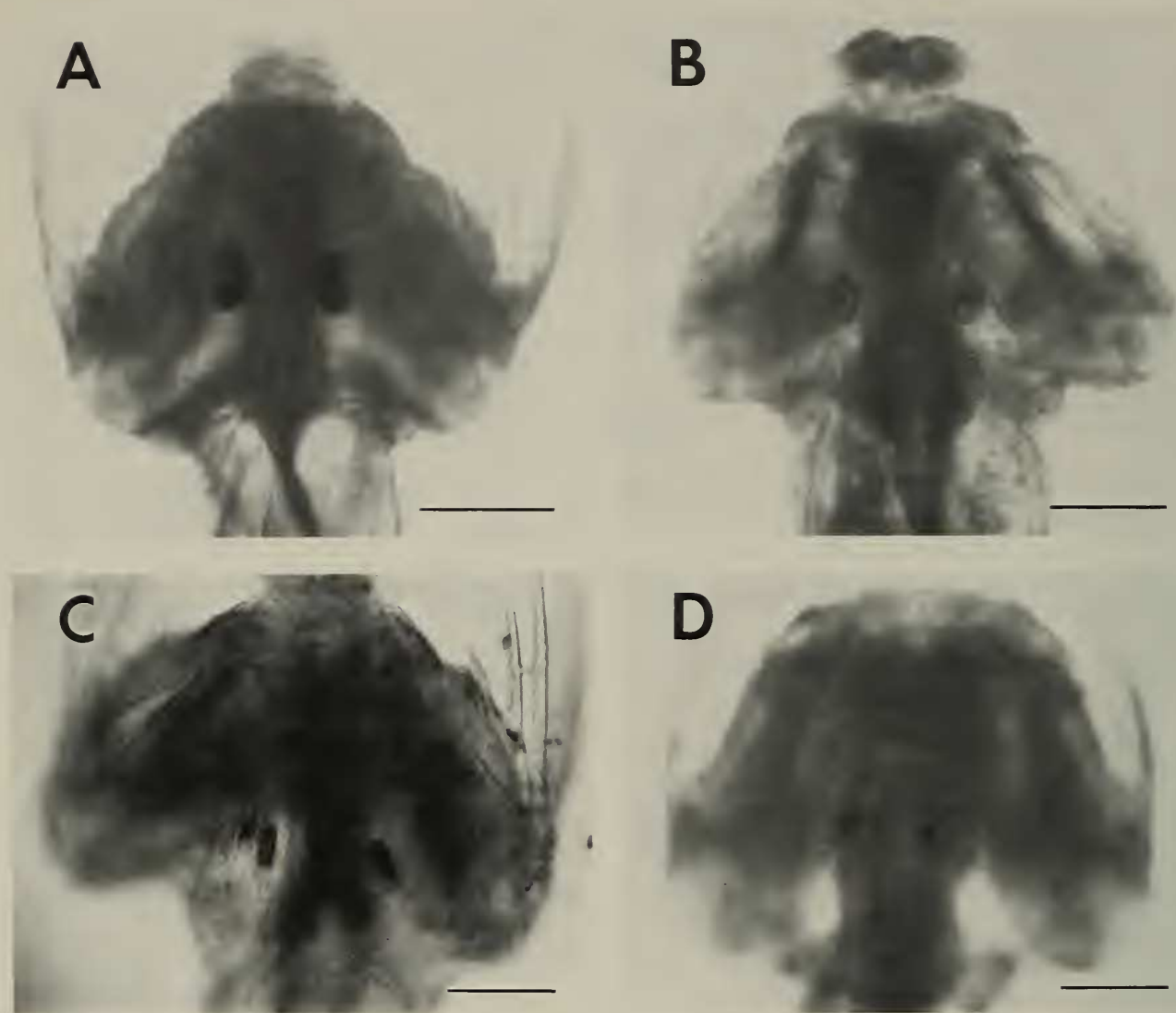


Fig. 4. Dorsal views of heads of the four species of *Eukrohnia* possessing pigmented eyes. A, *E. calliops*, holotype; B, *E. kitoui* Kuroda, 1981; C, *E. proboscidea* Furnestin & Ducret, 1965; D, *E. fowleri* Ritter-Zahony, 1909. Scales: A, B, and D = 0.5 mm; C = 0.2 mm.

rences below 1000 m, off the west African coast (Ducret 1965) and in samples collected between 750 and 1100 m in the Caribbean Sea (Owre 1973, Michel et al. 1976). *Eukrohnia kitoui* and *E. calliops* were collected at similar depths (0–400 and 200–677 m) in Tokyo Bay and the northern Gulf of Mexico, respectively, near undersea canyon areas where upwelling of water from deeper regions occurs.

It is worthy to note that at the Area 5 station (Table 1), no specimens of *E. calliops* were present, but in the February bottom net samples, one immature specimen of *E. proboscidea* was found, indicating the

northward extension of a deep-dwelling Caribbean population of that species. More extensive sampling near the bottom in these areas may identify boundaries between these two species in the Gulf of Mexico.

In the August 1987 cruise, the nets accidentally dragged bottom at the Area 2 station near the Desoto Canyon, resulting in a sample containing a large number (131) of *E. calliops* (Table 1). This suggests a possible hypo-planktonic distribution for the species in the Gulf of Mexico.

The genus *Eukrohnia* was not mentioned in any of the major studies of the chaetognath fauna of coastal areas of the Gulf of

Table 4.—Characteristics of the four species of *Eukrohnia* with pigmented eyes from descriptions published by Ducret (1965), Alvarino (1967), Kuroda (1981), Michel (1984), and from personal observations by the author.

| Character | <i>E. fowleri</i> Ritter-Zahony, 1909 | <i>E. proboscidea</i> Furnestini & Ducret, 1965 | <i>E. kitoui</i> Kuroda, 1981 | <i>E. calliops</i> , n. sp. |
|-------------------------------|--|--|--|--|
| Total length (mm) | 40 | 25 | 24.5 | 21.5 |
| % Tail length | 22–25 | 21.5–31 | 22–24 | 24–29 |
| Eye shape | Elliptical | Elongate | Circular to sub-oval | Oval to tear-drop shaped |
| Eye pigment | Variably shaped rectangular fleck in center of eye, black | Elongate to U-shaped in posterior part of eye, light-brown | Semi-circular in center of eye, dark brown to black | Large, lunate, in center of eye, dark brown to black |
| Apical gland | Single mass of cells, not protruding | Bilobate, protruding anteriorly | Bilobate, protruding anteriorly | Bilobate, protruding anteriorly |
| Hooks | 11–13, robust, strongly curved, reddish, tips straight | 10–13, slender, gently curved, light-brown, transparent, tips curved sharply inward | 8–13, slightly curved, light-brown, transparent, tips curved sharply inward | 11–13, slightly curved, light-brown, transparent, tips curved sharply inward |
| Posterior teeth | Up to 30 | Up to 25 | Up to 17 | Up to 21 |
| Transverse musculature extent | Level with posterior edge of ventral ganglion | Past ventral ganglion by up to 1/2 length of ganglion | Usually level with posterior edge of ventral ganglion | Past ventral ganglion by up to 1/4 length of ganglion |
| Epidermal col-larlette tissue | Thick band around body at ventral ganglion | Absent | Absent | Absent |
| Lateral fins | Extending from anterior 1/3 of ventral ganglion to middle of tail segment | Extending from base of ventral ganglion to middle of tail segment | Extending from slightly anterior to ventral ganglion to posterior third of tail segment | Extending from anterior third of ventral ganglion to posterior third of tail segment |
| Mature ovaries | Short (13% TL); ova large, in two rows | Short (15% TL); ova in 2 rows, about 14 per ovary | Short (13.5% TL); ova in 2 rows, 10–15 per ovary | Short (7.5–10.5% TL); ova in two rows, 10–14 per ovary |
| Seminal vesicles | Ovoid; adjacent to posterior fins and separated from tail fin a distance greater than their length | Ovoid, elongate; adjacent to insertion of lateral fins with anterior 1/3 overlapped by posterior edge of fins, separated from tail fin by about 1/2 their length | Ovoid; adjacent to insertion of lateral fins with anterior 1/3 overlapped by posterior edge of fins, separated from tail fin by about 1/2 their length | Ovoid, elongate; adjacent to insertion of lateral fins with anterior 1/3 overlapped by posterior edge of fins, separated from tail fin by about 1/2 their length |

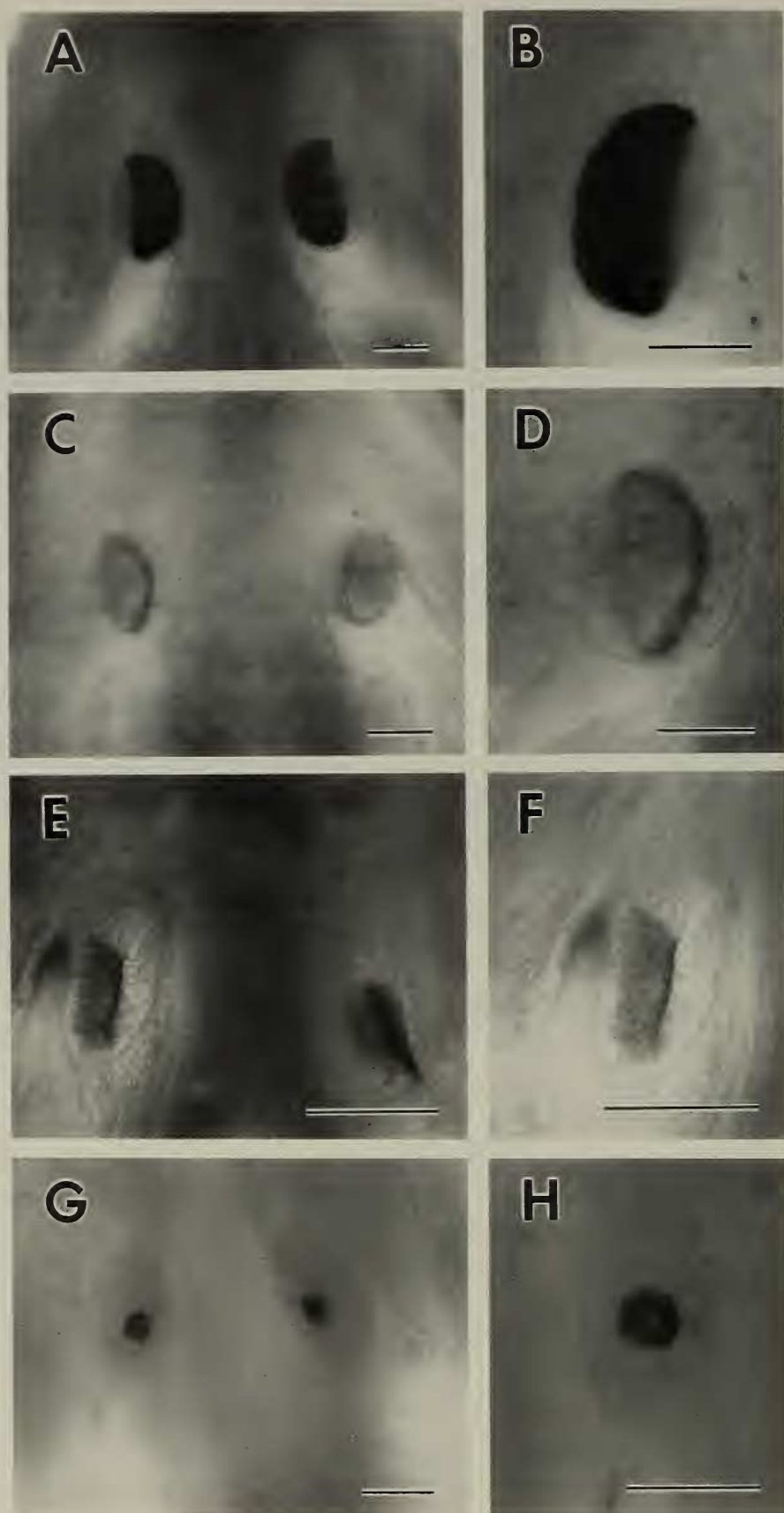


Fig. 5. Eyes of the four species of *Eukrohnia* possessing pigmented eyes. A, C, E, and G show relative distances between eyes and B, D, F, and H show detail of individual eyes. A and B, *E. calliops*, holotype; C and D, *E. kitoui* Kuroda, 1981; E and F, *E. proboscidea* Furnestini & Ducret, 1964; G and H, *E. fowleri* Ritter-Zahony, 1909. All scales = 0.1 mm.

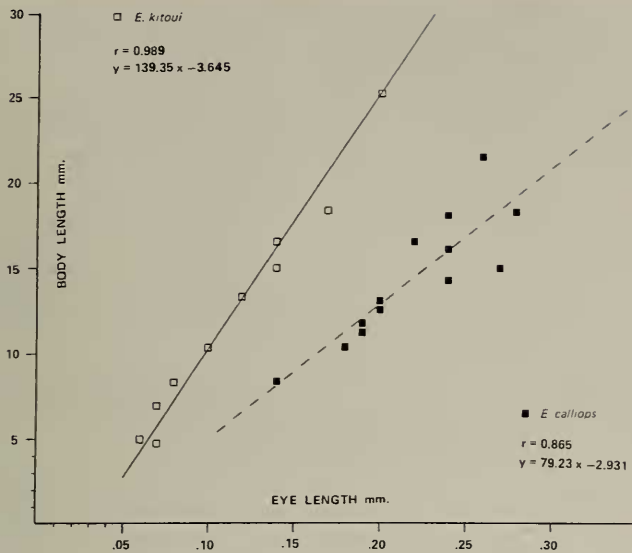


Fig. 6. Comparative relationships of body length to eye length for *Eukrohnia kitoui* and *E. calliops*.

Mexico (Pierce 1951, 1962; Suárez-Caabro 1955; Vega-Rodriguez 1965; McLelland 1984) because sufficient depths were either not present or not sampled. Deep-water studies from areas further removed from the continental slopes that did include four species of *Eukrohnia* are presented in Table 5. Based on personal observations and on characteristics of mature specimens reported in the literature, the following key separating the species of *Eukrohnia* occurring in the Gulf of Mexico is presented.

Key to the Species of *Eukrohnia* of the Gulf of Mexico

- 1a. Eyes with pigment 2
- 1b. Eyes non-pigmented 4
- 2a. Apical gland bilobate and protruding, causing head to appear pointed. Hook tips bent inward at 45 to 90 degree angles. Transverse musculature extending past posterior edge of ventral ganglion 3
- 2b. Apical gland not prominent, a single lobed mass. Hook tips straight, transverse musculature even with posterior edge of ganglion *E. fowleri*
- 3a. Eye pigment small, elongate or "U"-shaped, in posterior region of eye *E. proboscidea*
- 3b. Eye pigment large, lunate, encompassing most of the median portion of the eye *E. calliops*, n. sp.
- 4a. Number of hooks greater than 11, hook tips straight *E. bathyantartica*
- 4b. Number of hooks less than 11, hook tips bent inward 5
- 5a. Hooks stout, nearly straight; tail less than 25% of body length *E. hamata*
- 5b. Hooks long, gently curved; tail greater than 25% of body length *E. bathypelagica*

Table 5.—Distribution records of the genus *Eukrohnia* in the Gulf of Mexico.

| Species | Area | Position | Sampling depth (m) | Abundance | Source |
|---|--------------|-------------------|--------------------|--------------|----------------|
| <i>E. hamata</i> Mobius, 1875 | Central Gulf | 27°15'N, 029°09'W | 495–749 | Common | Pierce (1954) |
| <i>E. fowleri</i> Ritter-Zahony, 1909 | Central Gulf | 27°21'N, 088°42'W | 1100 | Common | Every (1968) |
| | Central Gulf | 24°39'N, 093°09'W | 2000 | 1 specimen | Fagetti (1968) |
| | SW Gulf | 21°55'N, 095°25'W | 509–1000 | 1 specimen | Fagetti (1968) |
| <i>E. bathyantartica</i> David, 1958 | Central Gulf | 24°39'N, 093°09'W | 2000 | 2 specimens | Fagetti (1968) |
| | Central Gulf | 27°08'N, 089°55'W | 1032–2000 | 1 specimen | Fagetti (1968) |
| | Central Gulf | 26°16'N, 087°52'W | 2002–2400 | 2 specimens | Fagetti (1968) |
| | Central Gulf | 23°41'N, 090°08'W | 1971–2800 | 1 specimen | Fagetti (1968) |
| | SW Gulf | 21°55'N, 095°25'W | 509–1900 | 2 specimens | Fagetti (1968) |
| | Central Gulf | 25°59'N, 086°11'W | 580–2000 | 15 specimens | Owre (1973) |
| <i>E. bathypelagica</i> Alvariño, 1962 | Central Gulf | 25°59'N, 086°11'W | 580 | 8 specimens | Owre (1973) |

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